Remarks

Examiner Lavilla is thanked for a through Office Action.

In the Claims

The claims are amended as discussed below. Note that all amendments to the claims not in response to prior art rejections. No new matter is added. Entry of all amendments is requested.

Claims 1, 15, 18, 31 and 32 are amended to overcome a 35 U.S.C. §112 rejection to either delete the reference to "a magnetoresistive resistivity sensitivity enhancing material" and /or change "a magnetoresistive resistivity sensitivity enhancing material" to –material--. No new matter is added.

Parent Claims 1, 15, 18, 31 and 32 are amended to overcome a 35 U.S.C. §112 rejection to include the limitation of "said metal oxide buffer layer and said free ferromagnetic layer have about the same crystal lattice constants; and said metal oxide buffer layer and said free ferromagnetic layer have the same crystal structure; ". For support see Spec. p. 4, L 10-16. p. 7, L 10-16. No new matter is added.

Claim 1 is also amended to deleted the limitations of the composition of the seed layer and metal oxide buffer oxide layers.

New claims 33 thru 36

New claims 33 thru 36 are added. For support for once amended claim 1. No new matter is added.

CLAIM REJECTIONS

Rejection under 35 U.S.C. §112 second para

The Rejection under 35 U.S.C. §112 second para is acknowledged. Reconsideration and withdrawal of the rejection is respectfully requested in view of the amendments.

Rejection of claim 1, 15 18, 31, and 32.

Regarding the rejection of the claims, claims 1, 15, 18, 31 and 32 are amended to either delete the reference to "a magnetoresistive resistivity sensitivity enhancing material" and /or change "a magnetoresistive resistivity sensitivity enhancing material" to – a material--. No new matter is added. See specp. 11, L 1-5 for an explanation of the seed layer.

Rejection under 35 U.S.C. §112 first paragraph

Rejection of claims 1-32 under 35 U.S.C. §112 first paragraph

The rejection of claims 1-32 under 35 U.S.C. §112 first paragraph is acknowledged. Reconsideration and withdrawal of the rejection is respectfully requested in view of the amendments.

The rejection is stated in the Office Action dated 4/19/02, page 2.

Parent Claims 1, 15, 18, 31 and 32 are amended to include the limitation of "said metal oxide buffer layer and said free ferromagnetic layer have about the same crystal lattice constants; and said metal oxide buffer layer and said free ferromagnetic layer have the same crystal structure; ". For support see Spec. p. 4, L 10-16. p. 7, L 10-16. No new matter is added.

CONCLUSION

In conclusion, reconsideration and withdrawal of the rejections are respectfully requested. Allowance of all claims is requested. Issuance of the application is requested.

It is requested that the Examiner telephone the undersigned attorney George Saile at (845) 452-5863 should there be anyway that we could help to place this Application in condition for Allowance.

Respectfully submitted,

Steve Ackerman
reg no. (37,761)

Version with markings to show changes

Please amend the claims as follows:

1. (Twice Amended) A method for forming a giant magnetoresistive (GMR) sensor element comprising:

forming a seed layer over a substrate[,]; [the seed layer being formed of a magnetoresistive resistivity sensitivity enhancing material selected from the group consisting of nickel chromium alloys, nickel -chromium-copper alloys and nickel-iron-chromium alloys;]

forming a metal oxide buffer layer over the seed layer; [said metal oxide buffer layer comprised of NiO or alpha Fe_2O_3;]

forming a free ferromagnetic layer over said metal oxide buffer layer; said metal oxide buffer layer and said free ferromagnetic layer have about the same crystal lattice constants; and said metal oxide buffer layer and said free ferromagnetic layer have the same crystal structure;

forming a non-magnetic conductor spacer layer over said free ferromagnetic layer;

forming a pinned ferromagnetic layer over the non-magnetic conductor spacer layer ; and

forming a pinning material layer over the pinned ferromagnetic layer; and

forming a capping layer over said pinning material layer.

15 (Amended) A method for forming a spin filter giant magnetoresistive (GMR) sensor element comprising:

forming a seed layer over a substrate, said seed layer [being] formed of a [magnetoresistive resistivity sensitivity enhancing] material selected from the group consisting of nickel chromium alloys, nickel -chromium-copper alloys and nickel-iron-chromium alloys;

forming a metal oxide buffer layer over the seed layer; said metal oxide buffer layer comprised of NiO or alpha $Fe2O_3$;

forming a high conductivity layer on said metal oxide layer;

forming a free ferromagnetic layer over said high conductivity layer; said metal oxide buffer layer and said free ferromagnetic layer have about the same crystal lattice constants; and said metal oxide buffer layer and said free ferromagnetic layer have the same crystal structure;

forming a non-magnetic conductor spacer layer over said free ferromagnetic layer;

forming a pinned ferromagnetic layer over the non-magnetic conductor spacer layer ; and

forming a pinning material layer over the pinned ferromagnetic layer;

forming a capping layer over said pinning material layer.

18 (AMENDED)A spin valve giant magnetoresistance (SVGMR) sensor comprising:

a seed layer over a substrate, said seed layer [being] formed of a [magnetoresistive resistivity sensitivity enhancing] material selected from the group consisting of nickel chromium alloys, nickel -chromium-copper alloys and nickel-iron-chromium alloys;

a metal oxide buffer layer over the seed layer; said metal oxide buffer layer comprised of NiO or alpha Fe_2O_3;

a free ferromagnetic layer over said metal oxide buffer layer; said metal oxide buffer layer and said free ferromagnetic layer have about the same crystal lattice constants; and said metal oxide buffer layer and said free ferromagnetic layer have the same crystal structure;

a non-magnetic conductor spacer layer over said free ferromagnetic layer;

a pinned ferromagnetic layer over the non-magnetic conductor spacer layer ; and

a pinning material layer over the pinned ferromagnetic layer; and

a capping layer over said pinning material layer.

31.(Amended) A method for forming a giant magnetoresistive (GMR) sensor element comprising:

forming a seed layer over a substrate, the seed layer [being] formed of a [magnetoresistive resistivity sensitivity enhancing] material selected from the group consisting of nickel chromium alloys, nickel -chromium-copper alloys and nickel-iron-chromium alloys;

forming a metal oxide buffer layer over the seed layer; said metal oxide buffer layer comprised of NiO or alpha Fe_2O_3;

forming a free ferromagnetic layer over said metal oxide buffer layer; said free ferromagnetic layer is comprised of: CoFe, CoFe/NiFe, or Co/NiFe; said metal oxide buffer layer and said free ferromagnetic layer have about the same crystal lattice constants; and said metal oxide buffer layer and said free ferromagnetic layer have the same crystal structure;

forming a non-magnetic conductor spacer layer over said free ferromagnetic layer;

forming a pinned ferromagnetic layer over the non-magnetic conductor spacer layer ; and

forming a pinning material layer over the pinned ferromagnetic layer; and

forming a capping layer over said pinning material layer.

32.(Amended) A spin valve giant magnetoresistance (SVGMR) sensor comprising:

a seed layer over a substrate, said seed layer [being] formed of a [magnetoresistive resistivity sensitivity enhancing] material selected from the group consisting of nickel chromium alloys, nickel -chromium-copper alloys and nickel-iron-chromium alloys;

a metal oxide buffer layer over the seed layer; said metal oxide buffer layer comprised of NiO or alpha Fe_2O_3;

a free ferromagnetic layer over said metal oxide buffer layer; said free ferromagnetic layer is comprised of: CoFe, CoFe/NiFe, Co/NiFe; said metal oxide buffer layer and said free ferromagnetic layer have about the same crystal lattice constants; and said metal oxide buffer layer and said free ferromagnetic layer have the same crystal structure;

a non-magnetic conductor spacer layer over said free ferromagnetic layer;

a pinned ferromagnetic layer over the non-magnetic conductor spacer layer ; and

a pinning material layer over the pinned ferromagnetic layer; and

a capping layer over said pinning material layer.

Please add new claims as follows:

33. (new) The method of claim 1 which further includes said seed layer formed of a selected from the group consisting of nickel chromium alloys, nickel -chromium-copper alloys and nickel-iron-chromium alloys.

34. (new) The method of claim 1 wherein said metal oxide buffer layer comprised of NiO or alpha Fe_2O_3.

35. (new) The method of claim 1 wherein said metal oxide buffer layer comprised of NiO or alpha Fe_2O_3; and said free ferromagnetic layer is comprised of a material selected from the group consisting of: CoFe, CoFe/NiFe, and Co/NiFe

36. (new) The spin valve giant magnetoresistance sensor of claim 18 wherein said seed layer being formed of a material selected from the group consisting of nickel chromium alloys, nickel - chromium-copper alloys and nickel-iron-chromium alloys.